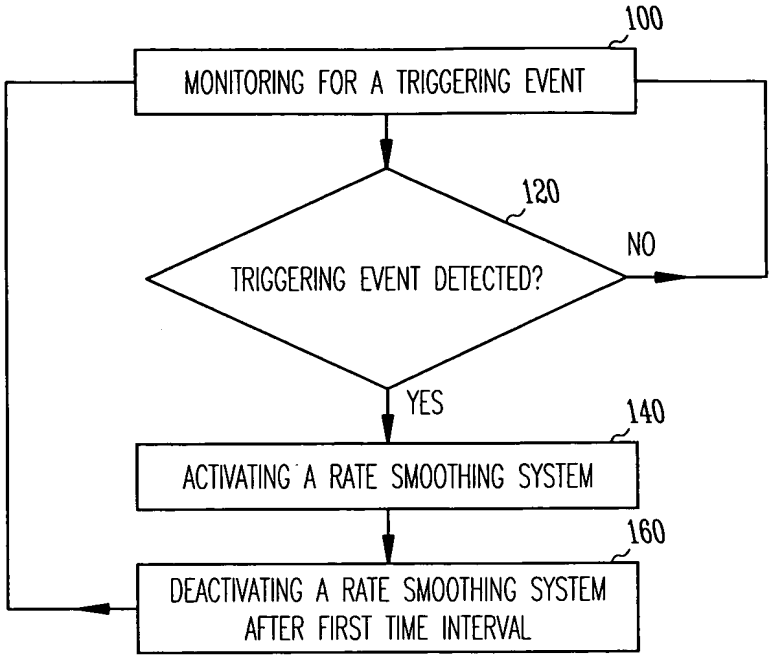
100
MONITORING FOR A TRIGGERING EVENT
120
TRIGGERING EVENT DETECTED?
NO
YES
140
ACTIVATING A RATE SMOOTHING SYSTEM
160
DEACTIVATING A RATE SMOOTHING SYSTEM AFTER FIRST TIME INTERVAL

Fig.1

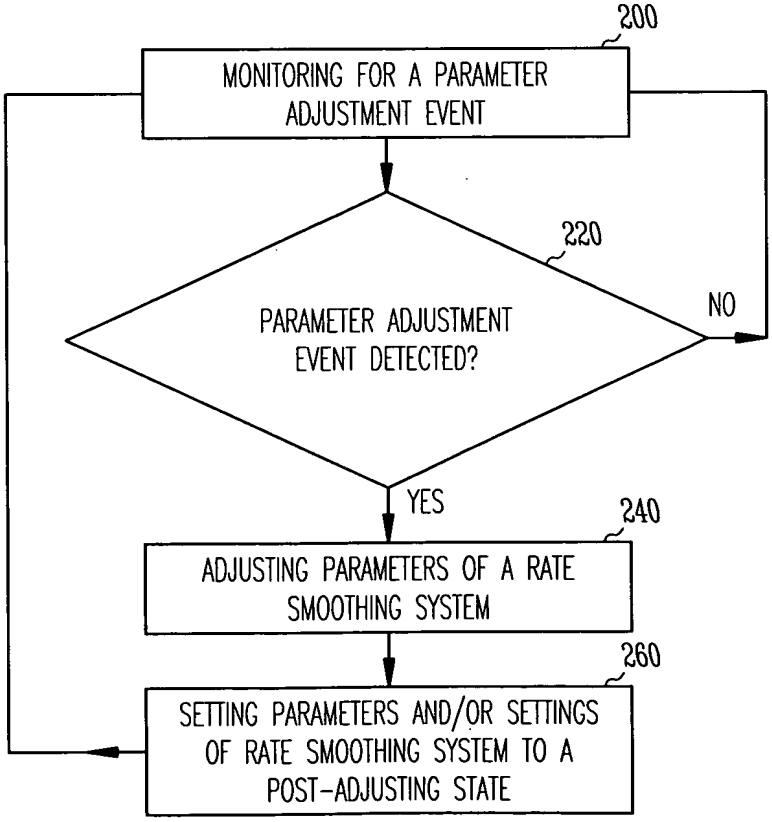
200
MONITORING FOR A PARAMETER ADJUSTMENT EVENT
220
PARAMETER ADJUSTMENT EVENT DETECTED?
NO
YES
240
ADJUSTING PARAMETERS OF A RATE SMOOTHING SYSTEM
260
SETTING PARAMETERS AND/OR SETTINGS OF RATE SMOOTHING SYSTEM TO A POST-ADJUSTING STATE

Fig.2

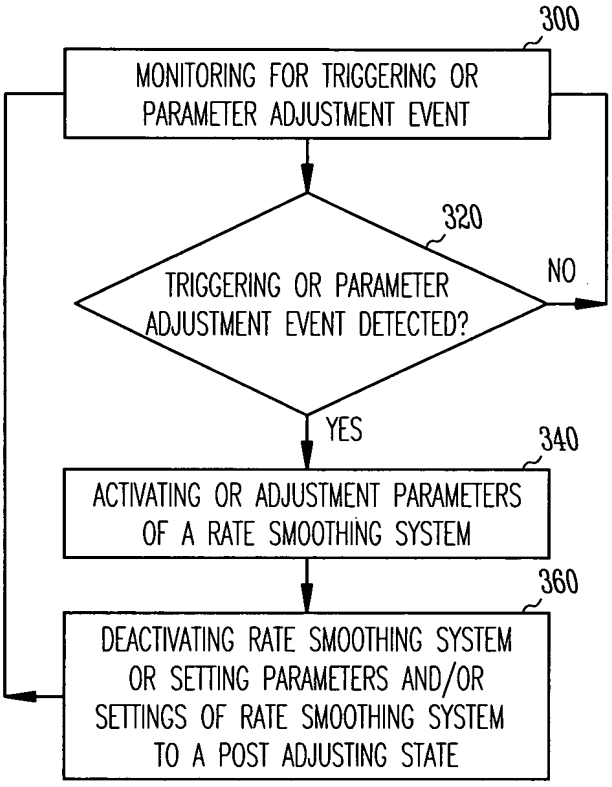
300
MONITORING FOR TRIGGERING OR PARAMETER ADJUSTMENT EVENT
320
TRIGGERING OR PARAMETER ADJUSTMENT EVENT DETECTED?
NO
YES
340
ACTIVATING OR ADJUSTMENT PARAMETERS OF A RATE SMOOTHING SYSTEM
360
DEACTIVATING RATE SMOOTHING SYSTEM OR SETTING PARAMETERS AND/OR SETTINGS OF RATE SMOOTHING SYSTEM TO A POST ADJUSTING STATE

Fig.3

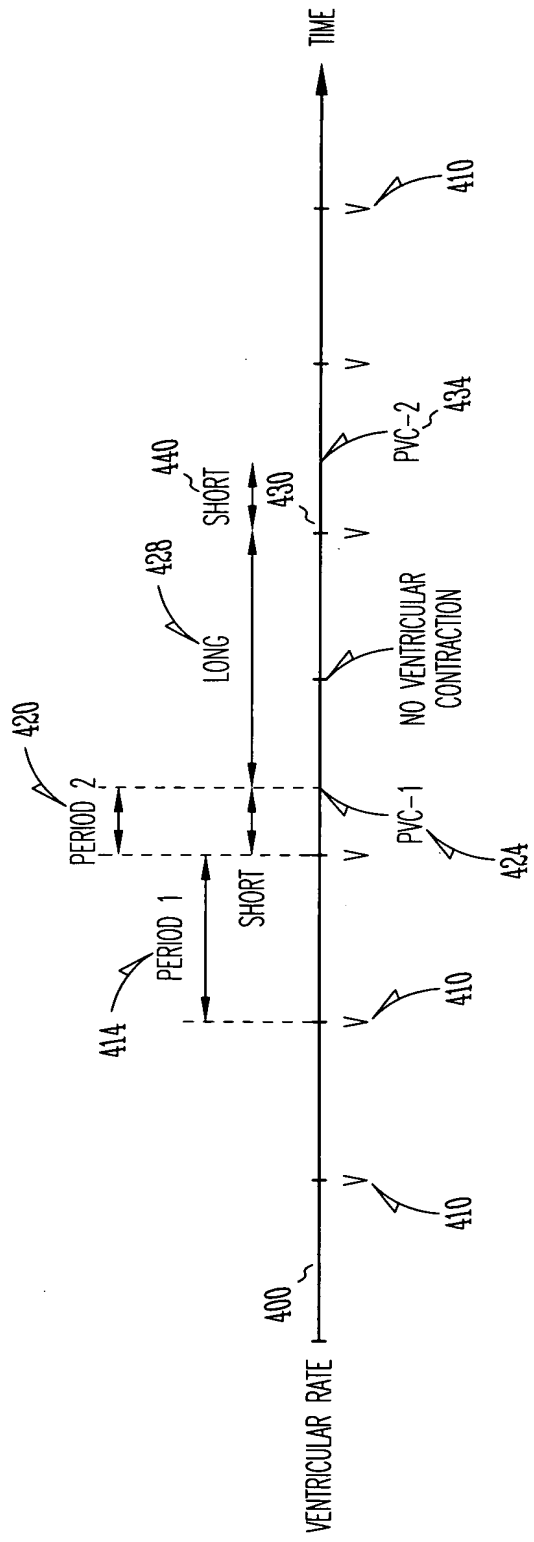
TIME
VENTRICULAR RATE
400
410
414
420
424
428
430
434
440
PERIOD 1
PERIOD 2
SHORT
LONG
SHORT
PVC-1
PVC-2
NO VENTRICULAR CONTRACTION

Fig.4

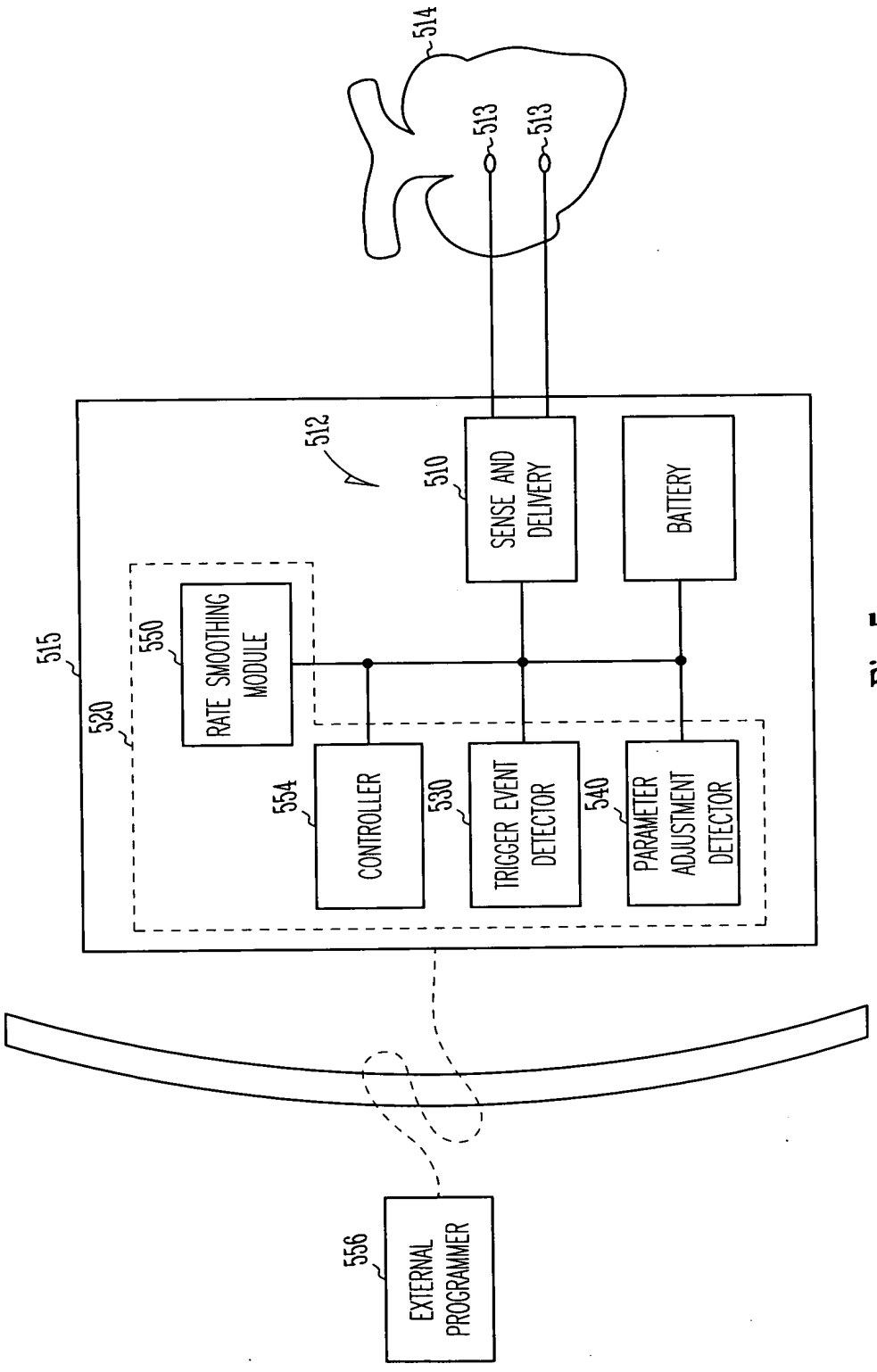
500
514
513
513
512
510
SENSE AND DELIVERY
BATTERY
515
520
550
RATE SMOOTHING MODULE
554
CONTROLLER
530
TRIGGER EVENT DETECTOR
540
PARAMETER ADJUSTMENT DETECTOR
556
EXTERNAL PROGRAMMER

Fig.5

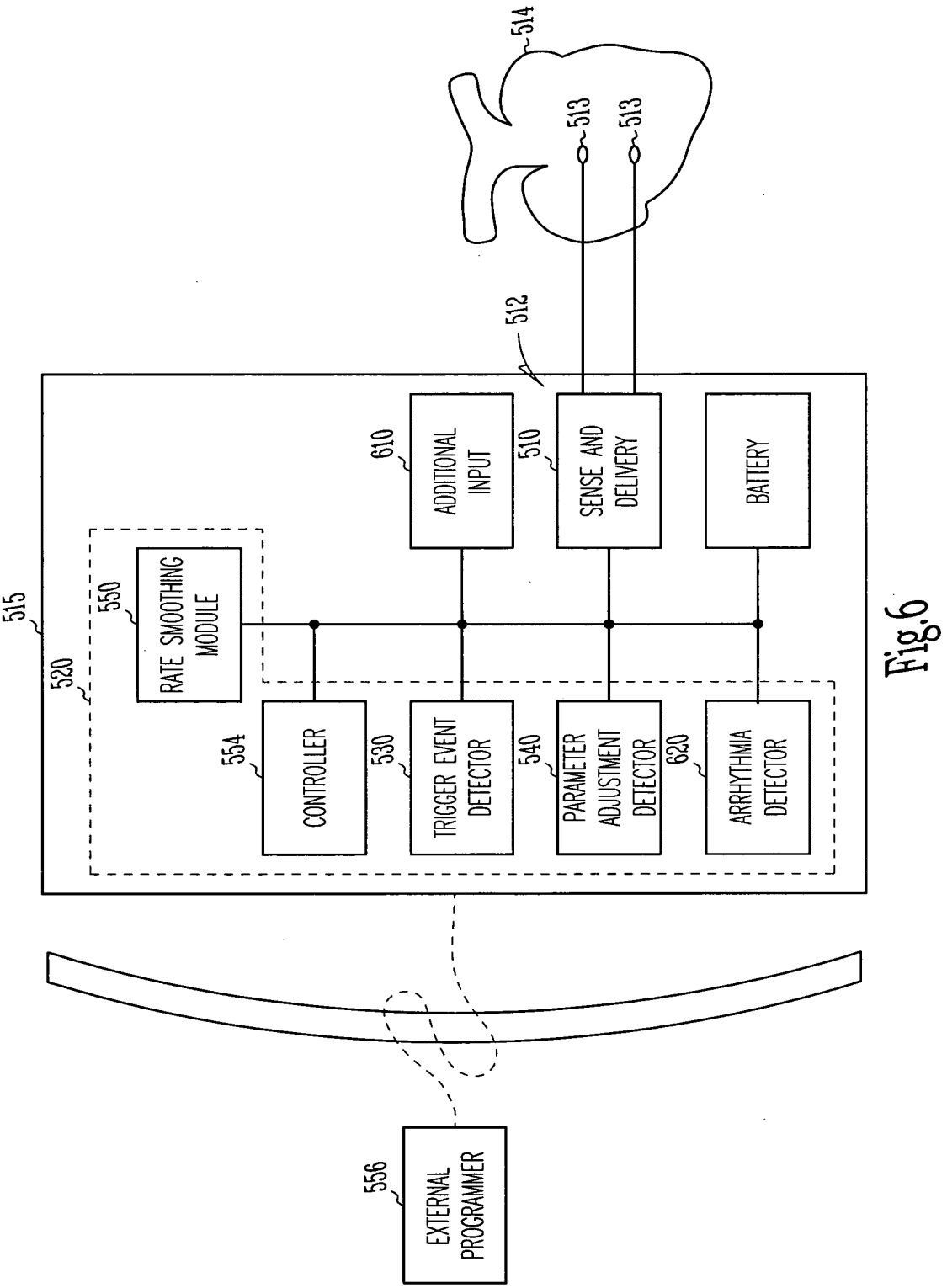
600
514
513
513
512
610
ADDITIONAL INPUT
510
SENSE AND DELIVERY
BATTERY
515
550
RATE SMOOTHING MODULE
520
554
CONTROLLER
530
TRIGGER EVENT DETECTOR
540
PARAMETER ADJUSTMENT DETECTOR
620
ARRHYTHMIA DETECTOR
556
EXTERNAL PROGRAMMER

Fig.6

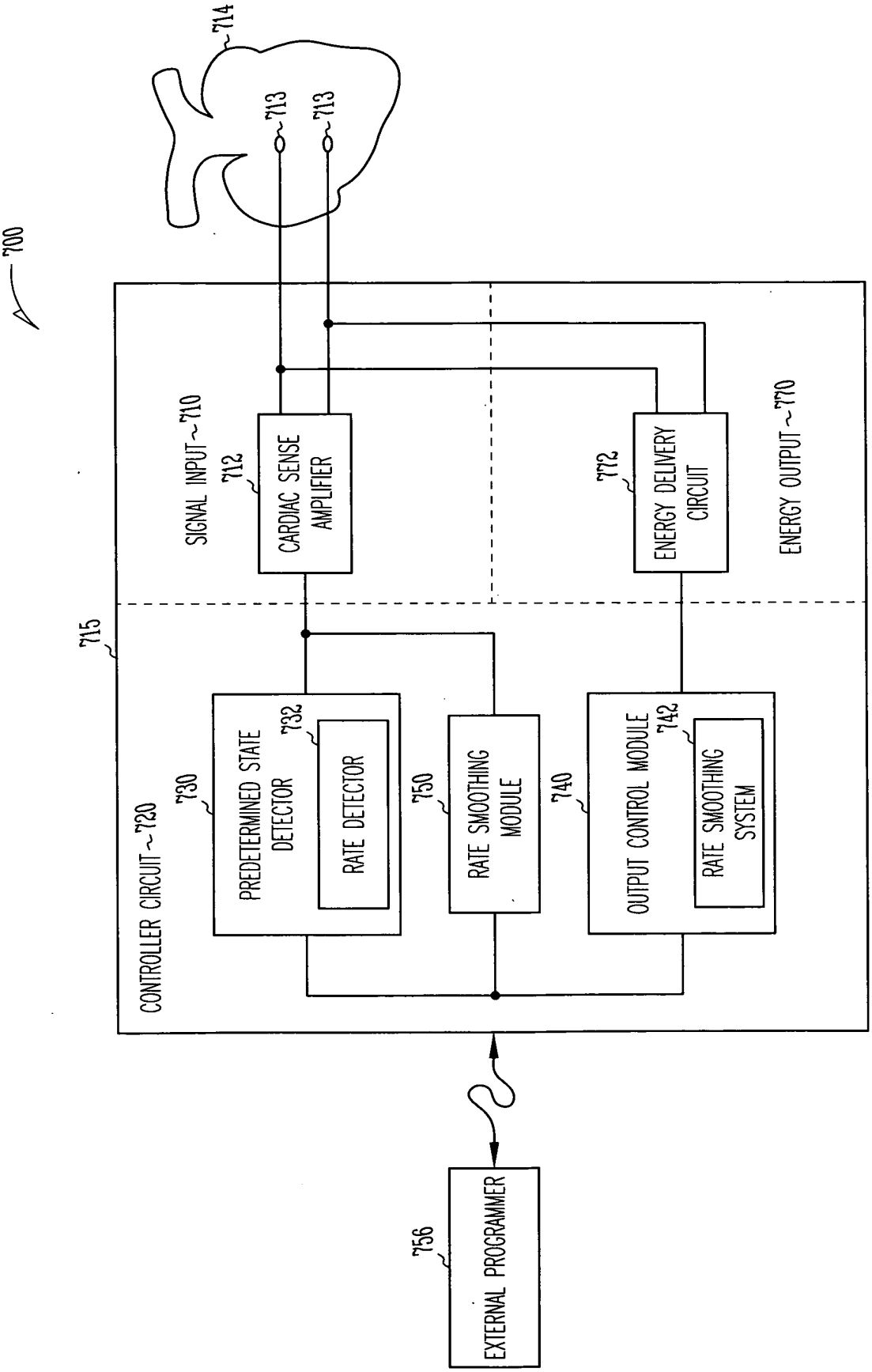
700
714
713
713
SIGNAL INPUT ~710
712
CARDIAC SENSE AMPLIFIER
772
ENERGY DELIVERY CIRCUIT
ENERGY OUTPUT ~770
715
CONTROLLER CIRCUIT ~720
730
PREDETERMINED STATE DETECTOR
732
RATE DETECTOR
750
RATE SMOOTHING MODULE
740
OUTPUT CONTROL MODULE
742
RATE SMOOTHING SYSTEM
756
EXTERNAL PROGRAMMER

Fig.7

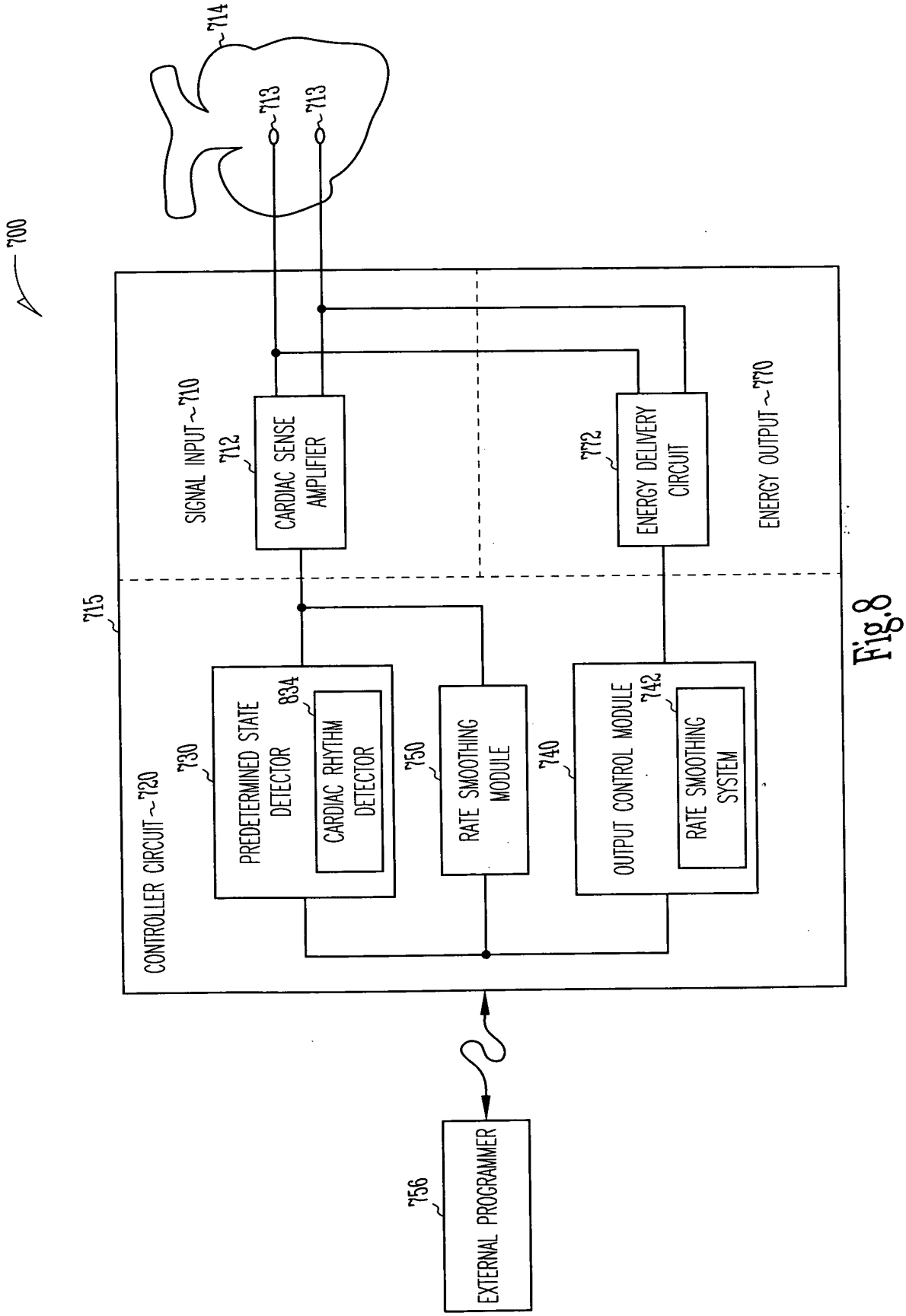
700
714
713
713
SIGNAL INPUT ~710
712
CARDIAC SENSE AMPLIFIER
772
ENERGY DELIVERY CIRCUIT
ENERGY OUTPUT ~770
715
CONTROLLER CIRCUIT ~720
730
PREDETERMINED STATE DETECTOR
834
CARDIAC RHYTHM DETECTOR
750
RATE SMOOTHING MODULE
740
OUTPUT CONTROL MODULE
742
RATE SMOOTHING SYSTEM
756
EXTERNAL PROGRAMMER

Fig. 8

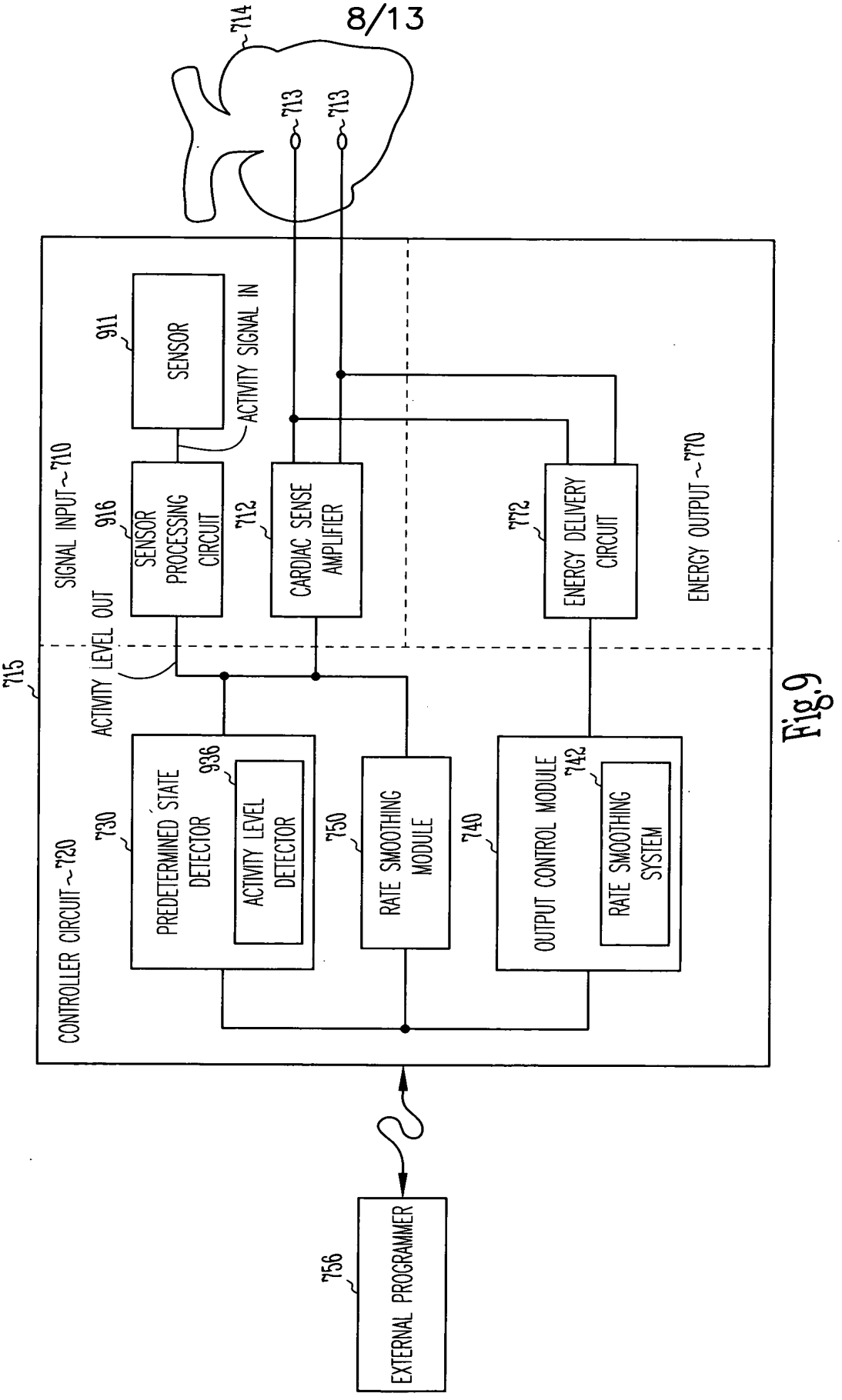
700
714
713
713
SENSOR
911
ACTIVITY SIGNAL IN
SIGNAL INPUT ~710
SENSOR PROCESSING CIRCUIT
916
CARDIAC SENSE AMPLIFIER
712
ENERGY DELIVERY CIRCUIT
772
ENERGY OUTPUT ~770
715
ACTIVITY LEVEL OUT
CONTROLLER CIRCUIT ~720
PREDETERMINED STATE DETECTOR
730
ACTIVITY LEVEL DETECTOR
936
RATE SMOOTHING MODULE
750
OUTPUT CONTROL MODULE
740
RATE SMOOTHING SYSTEM
742
EXTERNAL PROGRAMMER
756

Fig.9

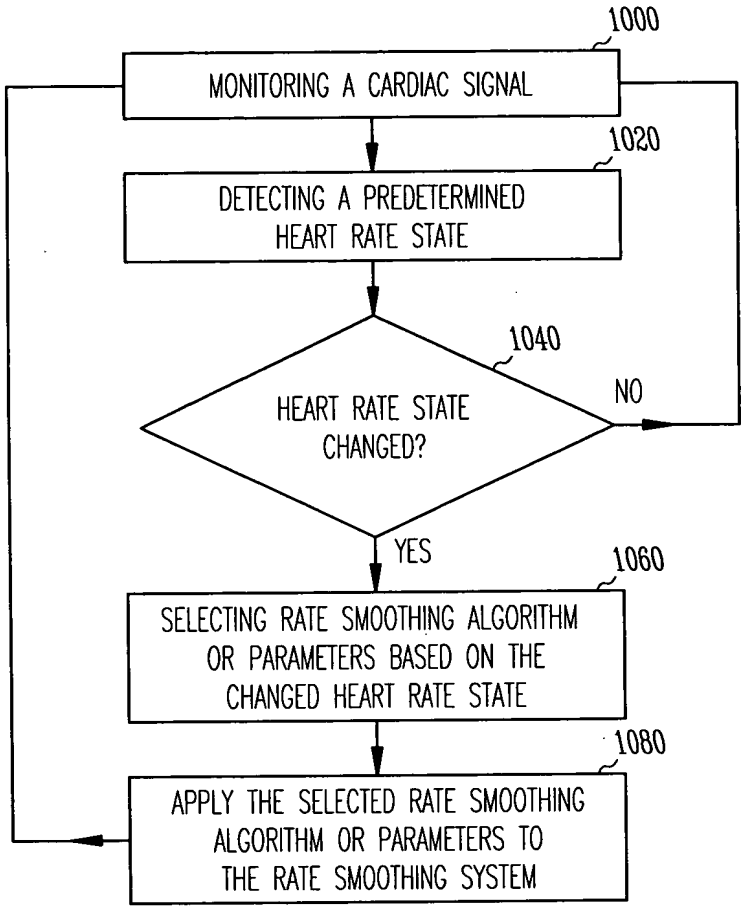
1000
MONITORING A CARDIAC SIGNAL
1020
DETECTING A PREDETERMINED HEART RATE STATE
1040
HEART RATE STATE CHANGED?
NO
YES
1060
SELECTING RATE SMOOTHING ALGORITHM OR PARAMETERS BASED ON THE CHANGED HEART RATE STATE
1080
APPLY THE SELECTED RATE SMOOTHING ALGORITHM OR PARAMETERS TO THE RATE SMOOTHING SYSTEM

Fig.10

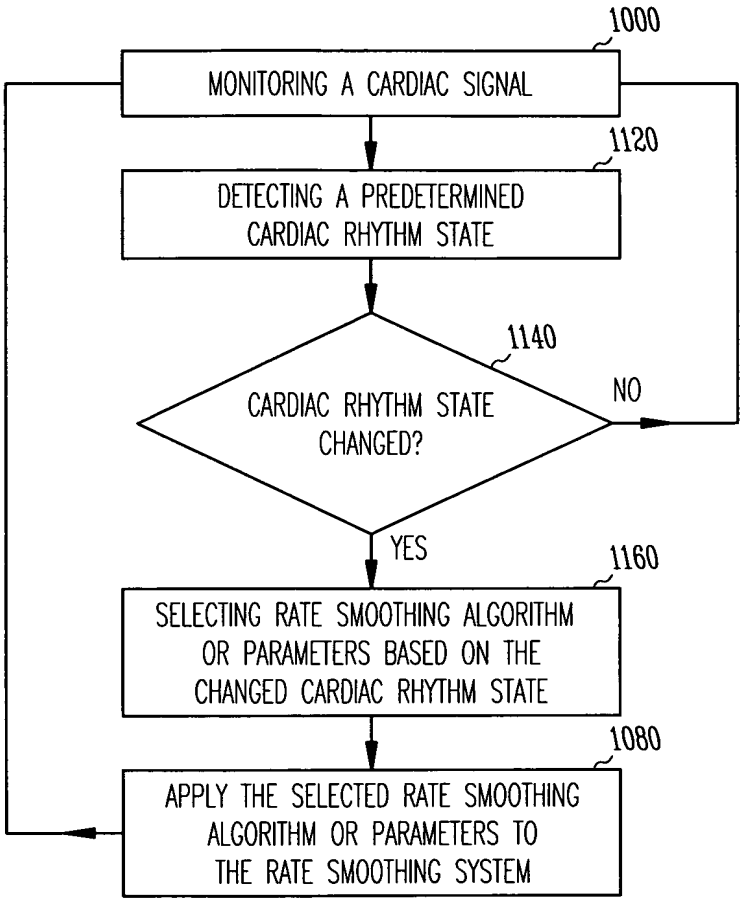
1000
MONITORING A CARDIAC SIGNAL
1120
DETECTING A PREDETERMINED CARDIAC RHYTHM STATE
1140
CARDIAC RHYTHM STATE CHANGED?
NO
YES
1160
SELECTING RATE SMOOTHING ALGORITHM OR PARAMETERS BASED ON THE CHANGED CARDIAC RHYTHM STATE
1080
APPLY THE SELECTED RATE SMOOTHING ALGORITHM OR PARAMETERS TO THE RATE SMOOTHING SYSTEM

Fig.11

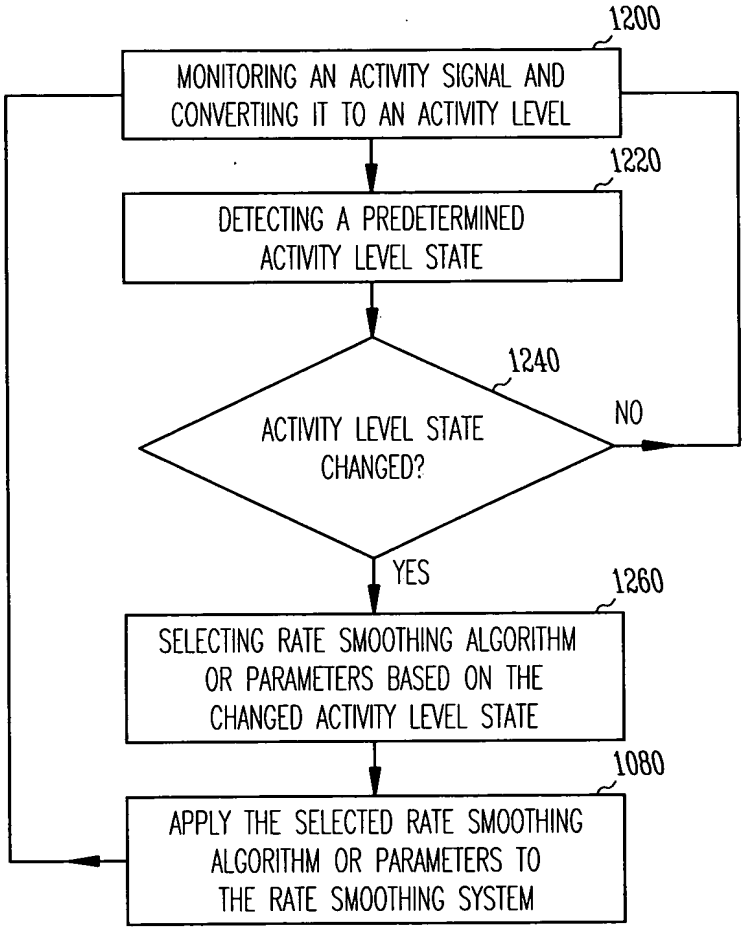
1200
MONITORING AN ACTIVITY SIGNAL AND CONVERTIING IT TO AN ACTIVITY LEVEL
1220
DETECTING A PREDETERMINED ACTIVITY LEVEL STATE
1240
ACTIVITY LEVEL STATE CHANGED?
NO
YES
1260
SELECTING RATE SMOOTHING ALGORITHM OR PARAMETERS BASED ON THE CHANGED ACTIVITY LEVEL STATE
1080
APPLY THE SELECTED RATE SMOOTHING ALGORITHM OR PARAMETERS TO THE RATE SMOOTHING SYSTEM

Fig.12

PREDETERMINED STATE 1300	PREDETERMINED RATE SMOOTHING ALGORITHM 1320
#1	A
#2	B
#3	C
#4	D
#5	E

Fig.13

PREDETERMINED STATE 1300	UP-SMOOTHING PERCENTAGE 1450	DOWN-SMOOTHING PERCENTAGE 1460
#1	15%	15%
#2	10%	15%
#3	15%	10%
#4	0%	15%
#5	15%	0%

Fig.14

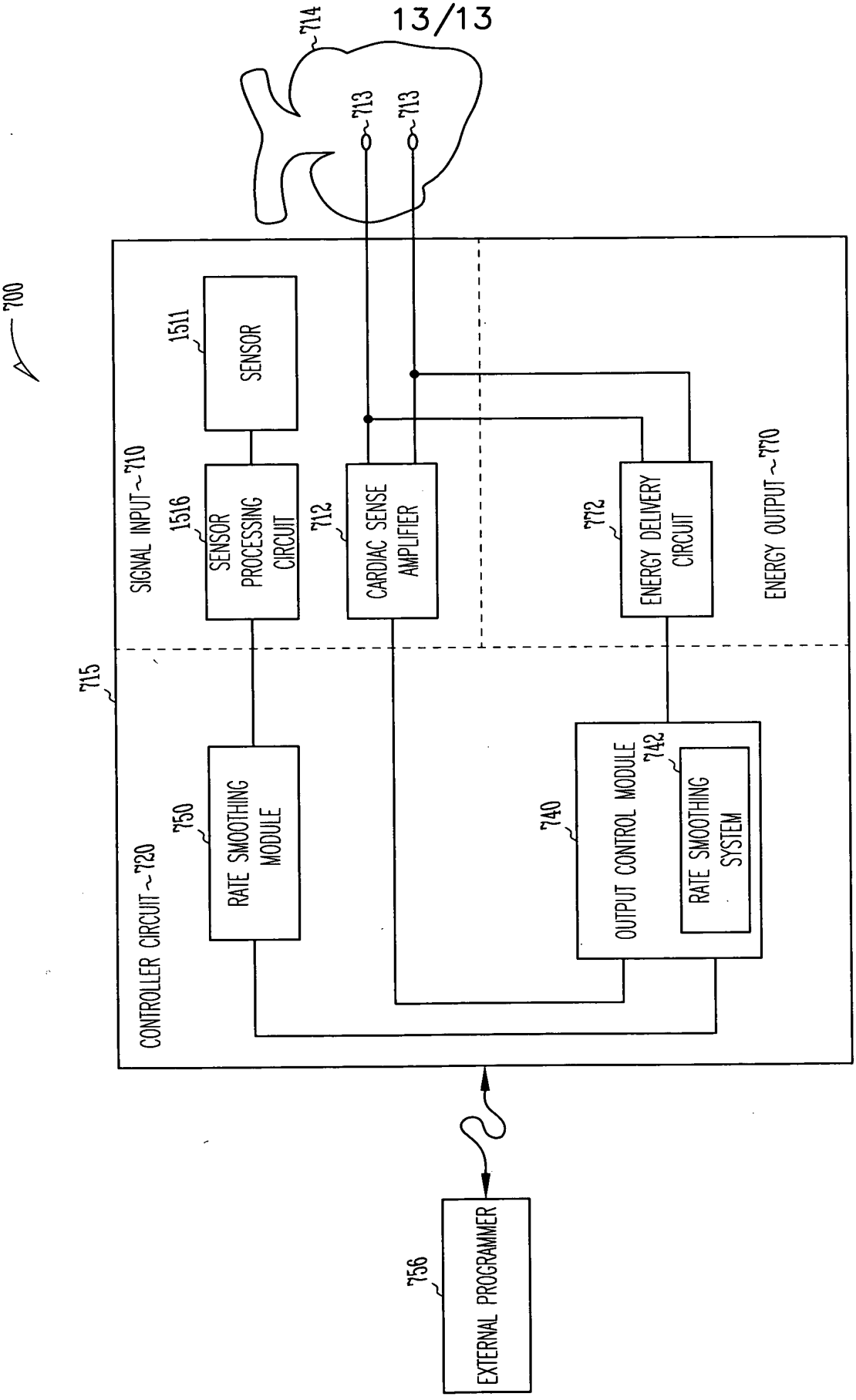
700
714
713
713
SIGNAL INPUT ~710
1511
SENSOR
1516
SENSOR PROCESSING CIRCUIT
712
CARDIAC SENSE AMPLIFIER
772
ENERGY DELIVERY CIRCUIT
ENERGY OUTPUT ~770
715
CONTROLLER CIRCUIT ~720
750
RATE SMOOTHING MODULE
740
OUTPUT CONTROL MODULE
742
RATE SMOOTHING SYSTEM
756
EXTERNAL PROGRAMMER

Fig.15